

Applicant: Antti Heikkinen et al.
Application No.: 10/694,291
Art Unit: 3725

Claim Listing

1. (currently amended) A multi-roll calender and a fibrous web traversing said multi-roll calender, which multi-roll calender is an on- or off-line multi-roll calender comprising separate first and second sets of rolls, each set of rolls comprising rigid-shell press rolls and resilient-shell backing rolls for the press rolls, placed alternately one after the other, successive nips being situated between the press rolls and the backing rolls placed against each other, as well as a reversing or guide member guiding the run of the fibrous web so that as the fibrous web extends from each press roll to each reversing or guide member, the web leaves a surface defined by either a press roll or a backing roll while traveling between successive nips, wherein in the on- or off-line multi-roll calender comprising two sets of rolls the fibrous web extends past an intermediate moistening means after a first set of rolls, and before the second set of rolls, and that in the calender:

a pre-moistening means immediately precedes the first set of rolls, and wherein the fibrous web enters the first set of rolls having a moisture content which is higher than the fibrous web moisture content immediately before the pre-moistening means;

the fibrous web has a moisture content which is lower immediately after the first set of rolls;

after the first set of rolls and the intermediate moistening means, the fibrous web has a moisture content which is higher than the moisture content of the fibrous web immediately before the intermediate moistening means; and

the fibrous web after the second set of rolls has a moisture level lower than the moisture level of the fibrous web before the second set of rolls.

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2. (original) The multi-roll calender of claim 1, wherein the fibrous web after the pre-moistening means has a moisture level of 3–10 %, and the fibrous web after the first set of rolls has a moisture level of 1–6 %, and after the intermediate moistening means the fibrous web has a moisture level of 6–14 %, and after the second set of rolls the fibrous web has a moisture level of 4.5–7.5 %.

3. (original) The multi-roll calender of claim 2 further comprising a means for overdrying the fibrous web before the pre-moistening unit preceding the first set of rolls, such that the moisture content of the fibrous web is lower than the equilibrium moisture content dependent on the ambient conditions.

4. (currently amended) The multi-roll calender of claim 1 wherein the web has a first side and a second side, and surface layers, and wherein ~~[[after]]~~ the intermediate moistening means is positioned opposite the first side of the fibrous web to produce a ~~[[is of]]~~ higher moisture content in the surface layers of ~~[[on]]~~ the first side of the fibrous web.

5. (canceled)

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6. (currently amended) A calender apparatus for control of the moisture gradient of a paper or board web, comprising:

means for pre-moistening the web for raising the moisture content of the web passing from a drying process;

a first set of rolls of a first multi-roll calender immediately following the means for pre-moistening the web, the first set of rolls comprising a plurality of rigid-shell press rolls and resilient-shell backing rolls for the press rolls, placed alternately one after the other, successive nips being formed between one of said rigid-shell press rolls and one of said resilient-shell backing rolls situated against each other, ~~as well as~~ a reversing or guide member preceding each successive nip guiding the run of the fibrous web, the first set of rolls acting to dry the web passing therethrough;

an intermediate moistening unit positioned to receive the web from the first set of rolls, and to raise the moisture content of the web; and

a second set of rolls of a second multi-roll calender comprising a plurality of rigid-shell press rolls and resilient-shell backing rolls for the press rolls, placed alternately one after the other, successive nips being formed between one of said rigid-shell press rolls and one of said resilient-shell backing rolls being situated against each other, as well as a reversing or guide member preceding each successive nip guiding the run of the fibrous web, the second set of rolls acting to dry the web passing therethrough to a desired final moisture level, the second set of rolls following the intermediate moistening unit.

7. (currently amended) The multi-roll calender of claim 6 wherein the rolls of the first set of rolls of the first multi-roll calender ~~[[has]]~~ have means for ~~[[the]]~~ relieving roll loads and the rolls of the second set of rolls of the second multi-roll calender ~~[[has]]~~ have means for ~~[[the]]~~ relieving roll loads.

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8. (currently amended) The multi-roll calender of claim 1 wherein the rolls of the first set of rolls [[has]] have means for [[the]] relieving roll loads and the rolls of the second set of rolls [[has]] have means for [[the]] relieving roll loads.

9. (new) The multi-roll calender of claim 6 wherein the web has a first side and a second side, and wherein the intermediate moistening unit is positioned opposite the first side of the fibrous web to produce a higher moisture in the surface layers of the first side of the fibrous web.